



Percutaneous Tenotomy, Bone Marrow Aspirate Concentrate and Soft Tissue Platelet-Rich Plasma

Rehabilitation Guideline – Upper Extremity

This rehabilitation program is designed to return the individual to their activities as quickly and safely as possible. It is designed for rehabilitation following the percutaneous tenotomy procedure, bone marrow aspirate concentrate (BMAC) injection or a soft tissue platelet-rich plasma (PRP) injection. Modifications to this guideline may be necessary dependent on physician-specific instruction, location of injection, concomitant injuries or procedures performed. This evidence-based percutaneous tenotomy, BMAC and PRP guideline is criterion-based; time frames and visits in each phase will vary depending on many factors — including patient demographics, goals and individual progress. This guideline is designed to progress the individual through rehabilitation to full sport or activity participation. The therapist may modify the program appropriately depending on the individual's goals for activity following the percutaneous tenotomy procedure or PRP injection.

This guideline is intended to provide the treating clinician a frame of reference for rehabilitation. It is not intended to substitute clinical judgment regarding the patient's post-procedure care based on exam/treatment findings, individual progress and/or the presence of concomitant procedures or post-procedure complications. If the clinician should have questions regarding post-procedure progression, they should contact the referring physician.

General Guidelines/Precautions:

- No icing or direct massage over injected area first 4 weeks
- No NSAIDs 5 days prior and 10 days after procedure — see physician orders
- Immobilization expected first 7-10 days per physician
- Sling dependent upon limb and procedure
 - Site and physician specific, typically 7-14 days
- High-rep, low-load strengthening initiated around 2 weeks
- Eccentric exercise around 6 weeks
- Return to sport timeframe expected 12-16 weeks per physician and patient goals
 - Criteria to be met for return to sport
 1. Excellent neuromuscular control plyometrics pain free
 2. Less than 10% strength deficit (if non-dominant side affected), at least 110% of opposite side (if dominant side affected) on isokinetic or isometric testing
 3. Meet all prior return to activity criteria (return to throwing progressions, etc.)

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PHASE	SUGGESTED INTERVENTIONS	GOALS/MILESTONES FOR PROGRESSION
<p>Phase I Protection Phase Weeks 0-1</p>	<p>Discuss: <i>Anatomy, existing pathology, rehab schedule, bracing and expected progressions</i></p> <p>Specific Instructions:</p> <ul style="list-style-type: none"> • Sling at all times • No icing or NSAIDs • No IASTM over area <p>Immediate Post-Injection instructions:</p> <ul style="list-style-type: none"> • Gentle active ROM of joint 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Protection of tissue for proper inflammatory response 2. Control post-procedure pain 3. Maintain range of motion <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. One week after procedure
<p>Phase II Protected Motion Phase Weeks 1-2 Expected visits: 0-2</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> • Weaning out of sling if indicated • Avoid loading affected area heavily • Load adjacent regions <p>Suggested Treatments:</p> <p>ROM: Continue with active motion exercises</p> <p>Exercise Examples:</p> <ul style="list-style-type: none"> • Begin light strengthening of adjacent regions dependent on area injected and per physician <p>Other Activities:</p> <ul style="list-style-type: none"> • Cardiovascular endurance exercise, dependent upon area injected and per physician 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Provide environment for proper healing of injury site 2. Prevention of post-operative complications <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. Control of post-operative pain (0-1/10 with ADLs) 2. Proper gait/joint mechanics 3. Two weeks after procedure

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<p>Phase III <i>Motion and Muscle Activation Phase</i></p> <p>Weeks 2-6</p> <p>Expected visits: 4-8</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> • Continue with previous exercise program • Initiate stretching and light strengthening • No eccentrics or plyometrics <p>Suggested Treatments:</p> <ul style="list-style-type: none"> • Initiate strength training with low load and high repetitions <p>Exercise Examples:</p> <ul style="list-style-type: none"> • Upper extremity <p>Weeks 2-4</p> <ul style="list-style-type: none"> - Submaximal shoulder and scapular isometrics - Rhythmic stabilizations - Weighted wrist flexion/extension - Sidelying abduction and external rotation - Theraband exercises for rotator cuff - Throwers 10 - no overhead <p>Week 4</p> <ul style="list-style-type: none"> - Initiate closed chain activities - Counter push-ups; to quadruped; to push-up - Prone plank; side plank <p>Other Activities:</p> <ul style="list-style-type: none"> • Cardiovascular endurance exercises including biking, elliptical, upper body ergometer • Proprioceptive and stability work such as rhythmic stabilizations and alternating isometrics • CKC progressions starting with static and progressing to dynamic • Aquatic program (if available) — including pool walking, and closed chain strengthening/balance consistent with restrictions above — swimming allowed 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Improve muscular strength and endurance 2. Improve neuromuscular control 3. Achieve full active ROM <p>Criteria to Advance to Next Phase:</p> <ol style="list-style-type: none"> 1. Full range of motion 2. No pain with activities 3. Strength testing at 5/5 with MMT
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<p>Phase IV <i>Advanced Strengthening and Eccentric Control Phase</i></p> <p>Weeks 6-12+</p> <p>Expected visits: 6-12+</p>	<p>Specific Instructions:</p> <ul style="list-style-type: none"> • Progression to eccentric strengthening • Progression to higher level activities and sports specific activities as strength and control dictate (as cleared by MD) <p>Suggested Treatments: <i>Depending on specific demands of the patient's goal for an activity level:</i></p> <p>May utilize specific power, strength, hypertrophy guidelines, if appropriate:</p> <ul style="list-style-type: none"> - 3-4 sets of 2-8 reps for strength (heavy weight, 2-3 min. rest) - 3-4 sets of 8-15 reps for hypertrophy (moderate weight, 45-60 sec. rest) - 3-4 sets of 1-5 reps for power (lighter weight, 5-10 min. rest) <p>Exercise Examples:</p> <ul style="list-style-type: none"> • Upper extremity <ul style="list-style-type: none"> - Upper limb plyometrics; open or closed chain <ul style="list-style-type: none"> - Supine med ball chest pass; double or single arm - Prone T or Y med ball drop/catch - Plyometric push-up/push-up walks - Initiate return to throwing program <p>Other Activities:</p> <ul style="list-style-type: none"> • Continue with previous core, cardiovascular, proprioceptive and aquatic programs as pain allows 	<p>Goals of Phase:</p> <ol style="list-style-type: none"> 1. Improve muscular strength and endurance 2. Promote excellent neuromuscular control with sport and work-related activities <p>Criteria for Discharge:</p> <ol style="list-style-type: none"> 1. Excellent neuromuscular control with dynamic activity and overhead plyometrics 2. <10% strength deficit (if non-dominant affected) on isokinetic testing dependent upon body part 3. 110% strength (if dominant side affected) on isokinetic testing dependent upon body part 4. Meet all prior return to activity criteria (return to throwing)
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REFERENCES:

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2. Nguyen RT, Borg-Stein J, McInnis K. Applications of platelet-rich plasma in musculoskeletal and sports medicine: an evidence-based approach. *PM&R.* 2011; 3:226-250.
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4. Mckay J, Frantzen K, Vercruyssen N, et al. Rehabilitation following regenerative medicine treatment for knee osteoarthritis: current concept review. *J Orthop Traum.* 2019; 10:59-66.
5. Mishra A, Woodall J, Vieira A. Treatment of tendon and muscle using platelet-rich plasma. *Clin J Sport Med.* 2009; 28:113-125.

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